

MEDICAL CONTROL GUIDELINE: AIRWAY / OXYGENATION / VENTILATION

DEFINITIONS:

Advanced Airway Maneuvers: Use of a cuffed endotracheal tube or King LTS-D to facilitate ventilation and/or oxygenation in a patient who is unable to protect his/her own airway or maintain spontaneous respiration.

Basic Airway Maneuvers: Manual airway positioning, obstructed airway maneuvers, bag-mask-ventilation (BMV), and/or use of airway adjuncts (nasopharyngeal or oropharyngeal airways) to provide ventilation and/or to facilitate oxygenation in a patient who is unable to maintain adequate spontaneous ventilation.

Hypoxia: Lower than normal oxygen (O_2) concentration in the blood resulting in diminished availability of O_2 to the body tissues.

Hypoventilation: Ventilation that is inadequate to support gas exchange in the lung.

Manageable Airway: Ventilation is effective, such that one of the following holds true:

- Patient is breathing adequately through a patent airway.
- Patient is mechanically ventilated effectively via bag-mask-ventilation (BMV), King LTS-D or endotracheal tube (ET).

Unmanageable Airway: The patient is not able to breathe adequately and EMS personnel are not able to maintain the patient's airway and/or cannot ventilate the patient effectively via BMV, King LTS-D or ET.

Unprotected Airway: The patient is not able to protect his/her airway from the risk of aspiration and is not being ventilated via a cuffed ET in the trachea. Ventilation may be effective with BMV or with insertion of a King LTS-D, but the airway is not fully protected from risk of aspiration.

PRINCIPLES:

1. Signs and symptoms of hypoxia may include O_2 saturation (SpO_2) less than 94% with respiratory distress, altered mental status or changes in skin signs.
2. Providing O_2 to emergency medical services (EMS) patients may be a lifesaving procedure. Both hypoxia and hyperoxia are potentially harmful; therefore, O_2 should be treated like any other drug and administered when indicated.
3. Hypoventilation results in high arterial carbon dioxide (CO_2). In general, this results in an end-tidal CO_2 greater than 45mmHg on capnography, but end-tidal CO_2 may not reflect arterial CO_2 when lung disease and/or increased dead space are present.
4. Basic airway maneuvers should be performed prior to advanced airway maneuvers on patients with hypoventilation.
5. Techniques and procedures utilized for airway management may vary based on operational environment, patient condition and the EMS personnel's level of training and expertise.
6. Unmanageable airway shall be transported to the most accessible receiving facility.

7. Advanced airway tube placement must be verified and continually monitored.
 - a. In Los Angeles County, Endotracheal intubation (ETI) is considered a definitive airway.
 - b. King LTS-D tubes may not protect the patient from aspiration. It is recommended that this be used when prehospital personnel are unable to secure a definitive airway (ETI) or when patient's medical condition or anatomy predicts likely failure of ETI.
8. Pulse oximetry and capnography are essential tools for monitoring the effectiveness of airway management. While pulse oximetry monitors oxygenation, it does not assess adequacy of ventilation. Capnography is necessary to monitor ventilation. Capnography is most accurate with proper two-person BMV technique or advanced airway.

GUIDELINES:

1. If pulse oximetry is not available (BLS Unit) and the patient is in mild or moderate respiratory distress, provide O₂ with nasal cannula at 2-6 liters per minute.
2. When available, use pulse oximetry to guide oxygen therapy. The desired SpO₂ for most non-critical patients is 94 – 98%. Document pulse oximetry reading.
3. Initiate O₂ therapy and titrate as follows:
 - a. Stable patients with mild hypoxia (SpO₂ less than 94%) – start O₂ with nasal cannula at 2-6 liters per minute or basic mask at 8-10 liters per minute
 - b. Patients unable to tolerate nasal cannula or basic mask – use blow-by technique with O₂ flowing at 15 liters per minute:
 - c. Start O₂ using the appropriate O₂ delivery system based on the patient's condition:
 - Non-rebreather mask – 12-15 liters per minute
 - BMV with reservoir – 15 liters per minute
 - Endotracheal tube – 15 liters per minute
 - King LTS-D airway – 15 liters per minute
 - CPAP – Refer to Ref. No. 1312
 - d. Indications for immediate high-flow O₂ include:
 - Respiratory Arrest
 - Cardiac Arrest
 - Shock/Poor Perfusion
 - Anaphylaxis
 - Traumatic Brain Injury
 - Carbon Monoxide Poisoning
 - Suspected Pneumothorax
 - e. Special Considerations:
 - Chronic Obstructive Pulmonary Disease (COPD) – goal SpO₂ is 88 – 92%
 - Newborns in need of positive-pressure ventilation – ventilate for 90 seconds with room air, if heart rate remains less than 100 beats per minute, start O₂ at 15 liters per minute
 - Pediatric Congenital Heart Disease – use O₂ with caution if known history of low baseline O₂ saturation
4. Continue O₂ therapy until transfer of patient care.

5. Monitor and document the SpO₂, O₂ delivery system used, and the liters per minute administered.
6. If suctioning is required, pre-oxygenate prior to suctioning and do not suction longer than 10 seconds per occurrence. For tracheal suctioning, maintain sterile procedures.
7. Considerations for oropharyngeal airway:
 - Unresponsive requiring BMV
8. Considerations for nasopharyngeal airway:
 - Spontaneously breathing patients who require assistance in maintaining a patent airway (e.g., seizure patient, intoxication)
 - Unresponsive patients requiring BMV in whom an oropharyngeal airway cannot be inserted
9. Considerations for BMV:
 - Apnea or agonal respirations
 - Altered level of consciousness with hypoventilation or hypoxia despite maximal supplemental O₂
10. Considerations for endotracheal intubation:
Adults or Pediatrics 12 years or greater, or longer than the length-based resuscitation tape (e.g., Broselow Tape)
 - Ineffective ventilation with BMV
 - Prolonged transport time
 - Unprotected airway
11. Considerations for rescue airway (King LTS-D)
Adults or Pediatrics 12 years or greater, and longer than the length-based resuscitation tape (e.g., Broselow Tape)
 - Unsuccessful attempts (maximum three attempts) at endotracheal intubation (with or without the use of a flexible introducer guide)
 - Suspected difficult airway based on assessment and anatomical features

Height	Size	Air
Between 4 feet to 5 feet	3	40-55mL
Between 5 feet to 6 feet	4	50-70mL
6 feet or greater	6	60-80mL

12. Verify endotracheal tube or rescue airway placement utilizing capnography. In case of device failure, use an End-tidal CO₂ detector or an Esophageal Detector Device (EDD). Document the method used for placement verification.
13. Additional confirmation of endotracheal tube placement shall include **all** of the following:
 - Bilateral lung sounds
 - Bilateral chest rise
 - Absent gastric sounds
 - Pulse oximetry

14. Continuously assess ventilation status and monitor capnography for all patients requiring BMV or advanced airway placement. Report capnography reading to the base hospital and document capnography reading as follows:
- Every five minutes during transport
 - After any patient movement
 - Upon transfer of care
 - Change in patient condition